

REMARKS

I. Status of the Claims

Claims 1-31 are pending. Claim 2 is canceled and claims 1, 3-9, and 16-25 are amended in this response. Upon entry of the amendment, claims 1 and 3-31 will remain for consideration.

II. Response to the Section 112 Rejection

Claim 9 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Applicants have amended the claim to simplify it and to overcome the rejection. In particular, claim 9 defines a process which comprises polymerizing or copolymerizing olefins (and thus could include additional conventional steps, such as polymer isolation or purification). The polymerization process requires the use of a particular supported catalyst, i.e., one prepared by the process of claim 1. Because the redrafted claim satisfies the definiteness requirement of Section 112, the Examiner should reconsider and withdraw the rejection.

III. Response to the Section 102 Rejection based on Derleth

Applicants traverse the rejection of claims 1-3, 7-9, 12, and 16-19 under 35 U.S.C. § 102(b) as anticipated by Derleth et al. (U.S. Pat. No. 5,716,898), and they respectfully ask the Examiner to reconsider and withdraw the rejection in view of their amendment of claim 1 and the following remarks.

Derleth teaches a way to make silica supports for chromium catalysts useful for ethylene polymerization. The supports are "microspheroidal powders of low dispersity." The powders are produced by: (a) forming a hydrogel; (b) grinding the hydrogel either in the presence of water (col. 2, line 44) or before combining it with water (see col. 2., ll. 44-45: "*Preferably, the hydrogel is ground and water is then added thereto.*"); (c) forming a suspension of the ground hydrogel and water; (d) atomizing the suspension by spray drying; (e) contacting

the spray-dried particles with an organic liquid that assists in drying; and (f) drying the particles to remove traces of moisture and organic liquid.

Among the steps described by Derleth, the grinding step is most relevant to Applicants' claimed process and is worth a closer look. Derleth teaches that grinding is advantageously "controlled so as to obtain particles with a diameter of less than 50 μm , for example of between 5 and 40 μm , values of between 10 and 30 μm being preferred" (col. 2., ll. 47-50). Consistent with these teachings, Derleth later describes (see Example 1 at col 6, ll. 46-49) a catalyst support preparation in which a hydrogel is formed, aged, and "treated in a colloid mill A ground hydrogel in the form of 10 to 30 μm particles was collected from the mill and about 10% of water was added to this ground hydrogel."

The Examiner asserts that Derleth anticipates Applicants' claimed process by teaching essentially the same steps. However, Applicants amended claim 1 to require that the "finely particulate hydrogel," (i.e., the milled hydrogel from step b) comprises:

- at least 5% by volume of the particles, based on the total volume of the particles, have a particle size in the range from $> 0 \mu\text{m}$ to $\leq 3 \mu\text{m}$; and
- at least 40% by volume of the particles, based on the total volume of the particles, have a particle size in the range from $> 0 \mu\text{m}$ to $\leq 12 \mu\text{m}$, and
- at least 75% by volume of the particles, based on the total volume of the particles, have a particle size in the range from $> 0 \mu\text{m}$ to $\leq 35 \mu\text{m}$.

The requirement of claim 1 to have *at least 5 vol.% of particles having a particle size $\leq 3 \mu\text{m}$* is not fairly taught or suggested by Derleth, which teaches hydrogels having a 10-30 μm range as most preferred. Moreover, the amended claim also requires *at least 40 vol.% of particles having a particle size $\leq 12 \mu\text{m}$* , and *at least 75 vol.% of particles having a particle size $\leq 35 \mu\text{m}$* . Of the three requirements, Derleth at best appears to disclose only the third one.

In contrast, see Applicant's Table I (application, p. 38), which shows five separate batches of milled hydrogels ("finely particulate hydrogels") produced by following steps (a) and (b) of the claimed process. For each batch, all three claim requirements are met. Batch 1, for instance, gave a milled hydrogel in which 10 vol.% of the hydrogel had a particle size less than 1.86 μm (meeting the at least 5 vol.% $\leq 3 \mu\text{m}$ limitation of claim 1). In the same batch, 50 vol.% of the hydrogel had a particle size less than 5.46 μm (meeting the at least 40 vol.% $\leq 12 \mu\text{m}$ limit), and 90 vol.% of the hydrogel had a particle size less than 13.63 μm (meeting the at least 75 vol.% $\leq 35 \mu\text{m}$ limit).

Because Derleth's compositions fail to meet all three requirements for the milled hydrogels produced during step (b) of Applicants' claimed process, Derleth fails to anticipate claim 1 as amended. The Examiner should reconsider and withdraw the rejection.

All of the remaining claims (3-31) refer back to and incorporate the limitations of claim 1 with respect to the milled hydrogels. Therefore, if claim 1 is new, each of claims 3-31 must also be new, and no further discussion is needed.

IV. Response to the Section 103 Rejection based on Derleth

Applicants traverse the rejection of claim 25 under 35 U.S.C. § 103(a) as unpatentable over Derleth.

The chromium content of supported catalysts made by Applicants' claimed process is not considered critical. More important is the distribution of particle sizes in the milled hydrogels, which is required by amended claim 1 and not taught or suggested by Derleth. The Examiner should reconsider and withdraw the rejection.

V. Response to the Section 103 Rejection based on Derleth, Mihan, and Meyer

Applicants traverse the rejection of claims 4, 20, and 21 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Mihan et al. (U.S. Pat. No. 6,469,111) and Meyer et al. (U.S. Publ. No. 2001/0041777).

Mihan teaches a gas-phase process for making polyolefins using ZnO or MgO-based antistatic agents. Meyer teaches the use of polymeric supports for heterometallocene complexes; the supported complexes are useful catalysts for making polyolefins.

Mihan describes silica gels as possible catalyst supports (col. 4, ll. 1-13) but does not disclose or suggest milled hydrogels meeting the particle size distribution limitations of Applicants' claims.

Meyer's supports are polyethylenes (including ethylene copolymers; see paragraph [0020]) rather than the claimed "hydrogels," which are inorganic oxides, so any discussion of particle size distributions is irrelevant.

The combined teachings add nothing to Derleth's disclosure with respect to the distribution of particle sizes in milled hydrogels, which is required by claims 4, 20, and 21. Other limits of these claims related to the kind of transition metal complex used are not considered critical. The Examiner should reconsider and withdraw the rejection.

VI. Response to the Section 103 Rejection based on Derleth, Mihan, and Song

Applicants traverse the rejection of claims 5, 6, 22, and 24 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Mihan and Song et al. (U.S. Pat. No. 5,391,657).

Song teaches a way to reduce static in an ethylene polymerization by adding to the reactor certain inorganic oxides, including silica.

Song is silent regarding the use of milled hydrogels having a particular particle size distribution as supports for olefin polymerization catalysts. The combined references fail to improve on Derleth's disclosure with respect to the distribution of particle sizes in milled hydrogels, which is required by claims 5, 6, 22, and 24; other limits of these claims related to various activation methods are not considered critical. The Examiner should reconsider and withdraw the rejection.

VII. Response to the Section 103 Rejection based on Derleth, Mihan, and Tsuji

Applicants traverse the rejection of claim 23 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Mihan and Tsuji et al. (U.S. Pat. No. 5,494,876).

Tsuji teaches a way to make improved fluorination catalysts that are useful for making hydrofluorocarbons.

Tsuji does not relate at all to silica hydrogels useful for supporting transition metal compounds or use of supported transition metal catalysts to make polyolefins. It is therefore not relevant at all to Applicants' claimed process. The combined references fail to improve on Derleth's disclosure with respect to the distribution of particle sizes in milled hydrogels, which is required by claim 23; other limits of this claim related to fluorination as an activation process are not considered critical. The Examiner should reconsider and withdraw the rejection.

VIII. Response to the Section 103 Rejection based on Derleth and Hlatky

Applicants traverse the rejection of claims 10, 11, and 26 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Hlatky et al. (U.S. Pat. No. 5,153,157).

Hlatky teaches the use of borate activators with metallocenes. The reference teaches that the metallocenes can be supported (col. 15, line 44), but provides no additional information.

Hlatky is silent regarding the use of milled hydrogels having a particular particle size distribution as supports for olefin polymerization catalysts. The combined references fail to improve on Derleth's disclosure with respect to the distribution of particle sizes in milled hydrogels, which is required by claims 10, 11, and 26; other limits of these claims related to the use of conventional activators for transition metal catalysts are not considered critical. The Examiner should reconsider and withdraw the rejection.

IX. Response to the Section 103 Rejection based on Derleth and Mihan

Applicants traverse the rejection of claims 13, 14, 27, and 28 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Mihan.

The claims relate to the mean particle size of the supported *catalyst particles*, i.e., the particle size of the product from steps (e) or (f) of Applicants' claim 1.

The particle size distribution limits of claim 1 related to the milled hydrogels formed in step (b) are incorporated into claims 13, 14, 27, and 28. As discussed earlier, each of Derleth and Mihan is silent regarding the use of milled hydrogels having a particular particle size distribution as supports for olefin polymerization catalysts. The additional limits related to the particle size of the product from steps (e) or (f) are not considered critical. The Examiner should therefore reconsider and withdraw the rejection.

X. Response to the Section 103 Rejection based on Derleth, Mihan, and Brant

Applicants traverse the rejection of claims 15 and 29-31 under 35 U.S.C. § 103(a) as unpatentable over Derleth in view of Mihan and Brant et al. (U.S. Pat. No. 5,712,352).

Brant teaches a metallocene-catalyzed, fluidized-bed, gas-phase process for making polyolefins.

Brant describes silica supports (col. 5, ll. 14-48) but is silent regarding the use of milled hydrogels having a particular particle size distribution. The combined references fail to improve on Derleth's disclosure with respect to the distribution of particle sizes in milled hydrogels, which is required by claims 15 and 29-31; other limits of these claims, which relate to *polymer* particle size, are not considered critical. The Examiner should reconsider and withdraw the rejection.

XI. Conclusion

In view their amendment and the remarks above, Applicants respectfully ask the Examiner to reconsider and withdraw the Section 112, 102, and 103 rejections and pass the case to issue. Applicants invite the Examiner to telephone their attorney at (610) 359-2276 if he believes that a discussion of the application might be helpful.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box. 1450, Alexandria, VA 22313-1450 on January 27, 2009

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